CARNEGIE COUNCIL

The Earth Institute's Steven Cohen Offers Hope for a Sustainable Future

June 29, 2017

Brazos Wind Farm near Fluvanna, Texas. CREDIT: Leaflet

Steven Cohen, Stephanie Sy

STEPHANIE SY: Welcome to Ethics Matter. I'm Stephanie Sy, and our guest today is Steven Cohen, the executive director of the Earth Institute at Columbia University. Steven has an extensive résumé, not all of which I will recall here. Suffice it to say, you have a rich background in environmental policy and in public management. Today we are going to be talking about the sustainable future.

Steven has what I would say is a rare positive perspective on the future of our planet, so I want to focus on your thinking around that. Thank you so much for joining us.

I watched a talk you gave in 2015 titled "A Positive Vision of the Transition to Sustainability." That was two years ago,

before we had an administration stacked with climate change skeptics. Are you changing your tune on that? Do you need to come out with a new talk?

STEVEN COHEN: No. I still believe that we're heading toward a renewable resource-based economy. I think that it's inevitable. It would be better if we had a president who was supportive of those goals and whose thinking had advanced since the mid-1970s, but unfortunately that's not what we have.

But it really doesn't matter. Companies, people, communities, local governments, they are all moving in the same direction. That was a talk I gave at the Ross School out in the Hamptons. They were taking their whole year and devoting it to sustainability studies, and this was the kickoff of helping their teachers get ready for that year. Nothing since then has changed my view, including the last several months.

STEPHANIE SY: I want to delve into some of the reasons you feel that businesses and local governments are on a path to sustainability, but I want to press you just a little bit further on the current administration, because a lot of people who care about climate change were up in arms after the Trump administration decided to pull out of the Paris climate accords. How do you view that action through first a policy lens, and then through a moral lens?

STEVEN COHEN: It was an unethical act by the president, without question. We have a responsibility to the rest of the world. We're the leading economy; we should be playing a leadership role on these issues of global sustainability, particularly climate change. So I think it was a mistake, and it was an immoral act. There is no question about that.

But I think that fortunately we live in a country with many sources of power. The president may be the single most powerful person, but we're a federal system. States have enormous power, cities get that power from the states, and corporations and communities have a lot of power. We're a federal system. So the president moving in one direction is bad.

The first thing that you saw afterward was a group of people led by Mike Bloomberg to universities and states and cities and corporations all saying, "we're still in," and actually asking the United Nations to let us represent this country for the greenhouse gas goals, which we're going to meet anyway.

STEPHANIE SY: You wrote in an article in the Huffington Post recently: "President Trump and his pals deny the importance of climate change, but they have inadvertently mobilized America's businesses, states, cities, and civil society to engage even more intensely in mitigating climate change and in building a renewable resource-based economy," very similar to what you just said. What makes you say that, beyond these companies saying "we will continue to follow these pledges"?

STEVEN COHEN: Part of the reason this is happening is that it's in our self-interest. It's not just an altruistic act. First, moving from fossil fuels to renewable energy is going to create a less expensive, less costly way of generating energy.

STEPHANIE SY: A lot of that is because renewables have become more affordable than fossil fuels in some cases.

STEVEN COHEN: Yes. Think about it this way: The source of energy from the sun is never going to cost us anything. So receiving that energy and storing it will get cheaper and cheaper as the technology advances.

It's the same thing we saw with computers. Computers used to be big and slow and expensive, and now we carry them around in our pocket. The smartphone I carry in my pocket has more computing power than the mainframe I used in graduate school.

STEPHANIE SY: The huge IBM processor.

STEVEN COHEN: Right, with people with white coats and air conditioners. That's going to happen to renewable energy.

Now, fossil fuels, you're going to always have to extract out of the ground, and you're always going to have to ship it to where you're using it. That's expensive. So just looking at the 20, 30, 40-year horizon, anybody looking at technology and looking at cost curves would say this transition is already underway, and it is just going to pick up momentum. There's going to be a tipping point where it is going to be so much cheaper and so much more convenient that people are going to wonder why they ever bothered with fossil fuels.

STEPHANIE SY: Do you think natural gas is going to be a transition to those renewables, or do you see—because my understanding is that there are places in China and India that are jumping straight to renewables from coal. What's your view on that in this country?

STEVEN COHEN: This country has a lot of natural gas, and we have the infrastructure to use it. New York City is highly dependent on natural gas—where we're sitting right now—for a lot of its energy. It's a decent transition fuel, but it also has the cost of fracking to bring it out of the ground; it has some of the same problems as other fossil fuels, but it is far better than coal. There is no comparison.

Yes, it will be a useful transition fuel, but the question is how long will that transition be taking place? In some places you're going to leapfrog—you're not going to need the transition.

STEPHANIE SY: That brings me to a study that came out of Stanford recently. It was a controversial study, for some reason, in the environmental world. It said that "all 50 states could achieve renewable energy by 2050," complete renewable energy. Is that realistic in your view?

STEVEN COHEN: David Victor and his colleagues came out with the opposite view, saying that we're not ready with current technology. I think the truth is probably somewhere between the two analyses.

I don't think we have that transformative technology in hand yet, but it's coming. In other words, human ingenuity—lots and lots of engineers, lots of scientists are working on the technology of renewable energy and of battery storage, where you're seeing enormous progress very, very quickly. The problem with renewable energy is it's intermittent. If you can store it and you can store it effectively, then the problem is solved.

I think both of these analyses don't really account for the cultural, political, and financial issues related to the diffusion of technology. How do new technologies get absorbed and utilized by people? One of the examples we've seen in our lifetime, of course, is the smartphone. Did you realize 10 years ago that you were going to be carrying a computer with you wherever you went and that life was unimaginable without being able to find out the restaurant I'm going into, what kind of reviews does it have? That was information nobody had or nobody even thought they needed, and now it's an essential part of life.

We don't know what the energy technology is going to look like 10 years from now, but I can tell you it's going to be better than what we have today.

STEPHANIE SY: I think the smartphone analogy is particularly apt when we talk about, as you said, that it doesn't matter that the federal government has pulled out of Paris. It doesn't matter that they are not making this a priority, because smartphones, that wasn't driven by government regulation or federal government doing anything.

STEVEN COHEN: Right. Actually they did deregulate. They broke up AT&T, for example, into the regional Bells, and there was some government action. But no, in general, a lot of the economic change over the 20th century and into the 21st century has been technological. Technology has transformed how we live, and the technology affects economics, culture, and society.

New York City is a great example. After World War II almost half of the gross domestic product (GDP) of this city was in manufacturing clothing. Now it's less than 2 percent. What happened? Part of it is that containerized shipping was too big for New York City's docks on the West Side. Where the High Line is, that was a freight train from the docks to the factories. Those factories are all gone; the docks are all gone. They're all in New Jersey because that's where the containerized port is.

So what happened? We went through almost two decades of economic misery in this city—we almost went bankrupt—and now that part of Manhattan is filled with high-end everything. Those changes were not made by government.

STEPHANIE SY: This sounds like a very capitalistic view.

STEVEN COHEN: We're in a global economy that's driven by capitalism.

STEPHANIE SY: Which is interesting because I've heard environmentalists say after the Trump administration pulled out of Paris: "Well, this is one thing that an authoritarian government like China can get right. They can make renewable energy happen." And what you're saying is really at odds with that.

STEVEN COHEN: First of all, people keep playing the war between the communists and the capitalists like it's still going on. The war is over. Both sides won. You go to China, and it's one of the most capitalist countries in the world. We have a mixed economy. It's a continuum. You do have authoritarian and democratic regimes, and the Chinese regime is authoritarian. But talking about the economic side of things, there is a mix of collective and individual in every society.

STEPHANIE SY: When we talk about China and India, which are the most populous—China by far the most polluting country in the world—you also talk about the fact that they can see the pollution. They can see and feel—I was based in Beijing for a couple of years as a journalist, and there were days where I felt like I needed to wear a face mask. That is putting real political pressure for them to go toward renewables.

That's not happening in this country. We haven't had that kind of pollution for decades.

STEVEN COHEN: Right, because the Clean Air Act—which is how we're going to regulate greenhouse gases, by the way—that's the other fact.

When George W. Bush was president, a bunch of states' attorneys general sued the Environmental Protection Agency (EPA), sued the federal government, to have greenhouse gases declared under the 1970 Clean Air Act as a "dangerous pollutant." The Supreme Court said "Yes, it is." The Clean Power Plan was the Obama administration's effort to finally issue that regulation. President Trump and Administrator Pruitt may pull it back, but they've got to then promulgate another regulation. That's mandatory.

STEPHANIE SY: Is it possible that that could get overturned at the Supreme Court?

STEVEN COHEN: Very unlikely. The law was quite clear; the Clean Air Act is quite clear. The only thing they could do is try to modify the Clean Air Act, and Congress will never do that.

STEPHANIE SY: What is your sense of what the role of the federal government should be? You were at the EPA, for example, and EPA regulations beyond the Clean Power Plan, the safety of drinking water, toxins in the air and in our environment, isn't that where the federal government does need to play a role?

STEVEN COHEN: It's important for them to play a role, particularly for interstate pollution; in other words, pollution that comes from Ohio and goes to New Jersey, or from Arizona to California, or something like that.

But in fact, one of the reasons why we passed the Clean Air Act and the Water Pollution Control Act in the early 1970s is we were worried that states would compete for dirty businesses. There is a counterforce which has come up because of the 1980s and the redefinition of the environmental problem as a health problem. In the 1970s and earlier, people thought, Well, the environment is an aesthetics issue. We care about nature and want to preserve the planet because it's a good thing to do. It turns out it's not just a good thing to do, it's necessary for your health. You can actually get sick and die from pollution.

So a lot of the political pressure for environmental protection comes from the ground up now. We have trouble in New York siting a big box store. Nobody's going to try to attract a dirty business into this place, or pretty much any state. Nobody wants it near them. Even states that have big economic problems don't want smoke-belching factories.

STEPHANIE SY: Even West Virginia and places where Donald Trump during the campaign said, "I will bring coal back, I will bring your jobs back."

STEVEN COHEN: That's really an immoral perspective. First of all, coal's not coming back.

STEPHANIE SY: For market reasons.

STEVEN COHEN: Yes. The coal people know that. In fact, one of the things that happened even before any regulation started to kick in is you had the automation of coal mines with mountaintop removal.

STEPHANIE SY: So there were fewer jobs anyway.

STEVEN COHEN: Yes. Those days are gone. In fact, one of the great problems we're going to face in the next 20 or 30 years—and we're already facing—is manual labor itself is being eliminated by machines and by robots and automation. We are in what I call the "brain-based economy" now. So the question is, how do you prepare people for a different kind of work? The idea that we're going to reopen coal mines—if you opened a big auto factory, it's not going to employ 5,000 people; it will employ a couple of hundred people running robots.

STEPHANIE SY: You seem very much, in the things that I've read and the things I've heard you say, to be somebody who very much believes in technology as sort of a savior out of our problems with climate. Is that the paradox, that at the same time technology is replacing human labor, and then you have a whole other set of problems? I realize this is a different topic, but it sounds like you have something to say about it.

STEVEN COHEN: But it's freeing us up. At the beginning of the 20th century, 40 percent of the people in the United States worked in agriculture; last year it was 1.2 percent. So what are we doing? Well, what we're doing is, at the Earth Institute we have four events managers; we have people all over the city working on new apps and working on technology and working in cultural institutions and working in the arts, and those things play a much bigger role in our economy than they did before. It used to be that most of the economy was getting food, clothing, and shelter. No longer. That's not a bad thing if people are prepared for it. The problem is—and this is where government has to play a role with educational institutions—preparing people for the economy of the 21st century.

STEPHANIE SY: The way they prepared people for the agricultural sector.

STEVEN COHEN: Yes. Well, the way they used to. I think now we really have to turn our attention to the kinds of employment that will be available for people and make sure that there is a safety net so during these transition periods they aren't starving in the streets.

STEPHANIE SY: Let's get back to your focus on renewable energy and policy around that. I want to dig a little deeper into the idea of market forces that are making renewables more popular, and whether you believe that market forces alone are enough to lower emissions to the Paris targets, let's say, which are somewhat arbitrary, but let's just say that.

STEVEN COHEN: I think it's a question of speed. Eventually market forces would work, but we want to do it faster. We already are damaging the planet with the accumulation of greenhouse gases. That's where government comes in, to speed things up. But it doesn't have to be the U.S. federal government. There are many other governments around the world that are thinking and working on this, and many companies, and cities in particular, are playing a leadership role. California and New York both have goals within the middle of the 21st century of moving toward a majority of renewable energy generation. I think that's the kind of transition we're going to be seeing, and I think that's what we need.

This isn't going to be an overnight transition. Energy is so important to so much of our lives, and what replaces fossil fuels has to be as cheap and convenient and reliable as fossil fuels. If it's not, it won't work.

STEPHANIE SY: How close are we to that?

STEVEN COHEN: We're close, but we don't have that transformative technology. We don't have the iPhone of renewable energy.

STEPHANIE SY: Is that the smart grid? Is that part of it? You mentioned batteries, and obviously being able to store solar or wind and then use it later on a cloudy day, but what about the smart grid? That kind of infrastructure would seem to me to require major federal funding.

STEVEN COHEN: Let's think about how the original grid was built. It was built a piece at a time. There was federal involvement for places in rural areas. So you had the Tennessee Valley Authority (TVA), and you had parts of the New Deal that had rural electrification. The market never would have reached those parts of the country without the government. But cities in particular, where most people live now, what you're starting to see is first the development of microgrids, which are institutions and communities setting up their own smart grids, and then we're going to knit them together.

When the first grid was set up, it was done piece by piece—nobody did the whole city or state at once—and then eventually it grew up. The smart grid will work the same way. In a sense, the way to think about it is grid modernization, giving the ability to have distributed generation of energy. But that's going to require a lot of action

at the state level to change the business model of utilities.

New York State has a brilliant energy czar, a fellow named Richard Kauffman, who speaks eloquently about how we change the utilities so that they can make money and amortize their debt, but change the model from the current highly centralized fossil fuel-based model to a decentralized renewable energy-based model, where the grid essentially plays a backup role.

STEPHANIE SY: States like California and New York clearly have prioritized sustainable development, sustainable energy models. Are we living in a situation where because this is up to states, and then you have a bunch of states in the middle of the country that are not interested in doing any of this and where there is not the political will for that, where eventually you have a real disparity in quality of life in things like air pollution locally and regionally and how that affects human health?

STEVEN COHEN: It could happen that way, although interestingly enough, states like Texas generate enormous amounts of wind energy.

STEPHANIE SY: Huge, huge.

STEVEN COHEN: They are the leader.

STEPHANIE SY: A lot of that done under Governor Perry.

STEVEN COHEN: Yes. But it's not done because people want to get next to their feelings about the environment. It's done because it's cheaper than any other way to generate energy.

So I think you're going to see more of that. Those places in the middle of the country will be more reliant on the market bringing that to scale. On the coasts I think we're going to see more of a public-private partnership. Ultimately it has to be public and private. Again, it would be helpful if we had an active federal government, but it's not essential.

STEPHANIE SY: Talk to me about your thoughts on nuclear, because that seems to be a point of division among environmentalists, some who believe this is the solution—zero carbon—for the most part.

STEVEN COHEN: Many of my colleagues think that, many climate scientists think that. I don't, for several reasons. First of all, I'm a political scientist, so I think more about the politics and the management issues. France, for example, is highly dependent on nuclear, but they have a very different political structure than we have, very centralized, and they've been able to handle it up until now.

I worked for a little while as a consultant to the U.S. nuclear waste program. We don't have a repository. We've done a lot of work toward opening one, but the senators in Nevada won't allow it to happen. Why? Because at this point there is so much nuclear waste accumulated in the civilian plants that when you start shipping it, it's all going to come to one point in Yucca Mountain, and mathematically it's almost inevitable that somewhere there will be an accident of some kind.

I don't like the waste. Nuclear technology could eventually become a useful technology, particularly if they had advanced fusion. If you could come up with a nuclear power that couldn't be made into a bomb and didn't create a dangerous toxic waste, that might be worth exploring, and I think someday that probably will happen.

For political reasons we went to nuclear too soon, and the nuclear power that we have has some properties which are not very good. I'll quote Barry Commoner, who used to say: "Nuclear power—it's a hell of a complicated way to boil water."

STEPHANIE SY: And it may be a hell of a dangerous one. Post-Fukushima, I feel like—

STEVEN COHEN: Right. You look at Fukushima and you see what happens, because the technology is sound, but human beings make mistakes. It's the human error that we have to be paying attention to.

STEPHANIE SY: What about technologies such as carbon capture? What I'm trying to get is after I ask you to comment on each of these is just sort of your broad review of where renewables are heading and your views on things like the carbon tax. So what about carbon capture?

STEVEN COHEN: Carbon capture and storage—you have to capture it, and then you have to store it—is something that we will have to do because we've already accumulated too much carbon dioxide in the atmosphere.

STEPHANIE SY: Like if we don't start taking carbon out that we've already created, we're going to be on a path toward what?

STEVEN COHEN: We're going to be altering the climate—which we've already done—but more than probably our ecosystem should be tolerating.

Again, a lot of climate change is natural; a lot of it is human-made. We know the difference—at least our scientists at the Earth Institute know the difference and have been analyzing that. We have over a hundred people in the Earth Institute working just on those issues.

But we have a group also working on taking the carbon from the atmosphere and turning it into something else. One of the more promising technologies is turning it into a solid. You could turn it into paving material. Those kinds of things are possible. We are going to have to do a lot more research and development to figure out how to do that. That is not going to be something that the market will ever pay for. That is going to be something that government is going to have to do.

STEPHANIE SY: Yes. I want to get into that toward the end of this talk, about how, again, the political situation at the federal level may actually affect the Earth Institute, but a few more questions about renewable energy because I have read that you do not support a carbon tax.

STEVEN COHEN: Right.

STEPHANIE SY: A lot of your colleagues, I know, at the Sabin Center and other areas within Columbia, they are for a carbon tax as sort of sending a market signal to raise the price of fossil fuel use.

STEVEN COHEN: Right. The idea is then that makes renewable energy more cost-effective. I'd rather go directly to the renewable energy and make it cheaper.

Part of the problem is that by putting a tax on something—particularly in the political environment we're in now—you are now going to be saying to people, "You're going to be paying more for your energy." Energy is not equally distributed. Poor people put a whole lot more of their income into energy than rich people do, and so they will be affected. Then they say, "Well, we'll give them back the money."

STEPHANIE SY: Some sort of dividend.

STEVEN COHEN: Yes. But the problem with that is unless you're giving it to them immediately it doesn't do that much good. You need something like the earned income tax credit (EITC) coming in their paycheck every couple of weeks—

STEPHANIE SY: That's been proposed.

STEVEN COHEN: Yes. It's possible.

The reason why people are so attracted to carbon tax and pricing carbon is that economics is a very powerful discipline, and our climate scientists like the math. It's an elegant solution. A carbon tax is an elegant solution. Theoretically I understand it, and you can chart the impact of price on behavior.

But there is also some price indifference on the use of energy. In other words: "I've got to go to work with my car. I'm a working person and my car doesn't get such great gas mileage, and I can't invest in the hybrid or the electric car, so I'm stuck." I worry about that part of it.

But what I'm really worried about more than anything else is that it is an indirect way to push renewables. I would rather go directly to fund the science and technology and have renewables drive fossil fuels out of the marketplace.

At the beginning of the 20th century the biggest environmental problem we had in New York City was horse manure. We were knee deep in it because the horse was the main way of transporting people before we got the subway and before we got the internal combustion engine. Well, nobody taxed the horse. They just made a car that drove the horse from the marketplace. Cars were cheaper, more convenient, and better technology.

What I'm saying is that we don't need to raise the price of the bad technology. Let's lower the price; make renewable energy cheaper, more convenient, and more reliable than fossil fuels, and you won't have to tax fossil fuels.

STEPHANIE SY: You're talking about that from research and development, to further develop renewable energy so that we can get to a place where it's cheaper. But that's also happening now because of subsidies that are continuing. Congress renewed those subsidies. Nuclear is not in there, but wind and solar are. Is that also part of sound policy to you?

STEVEN COHEN: Yes. I think that it is.

I would rather use tax expenditures. In other words, if you look at something like the deduction you get on your mortgage and property tax if you own a home, it turned America from a nation of renters to a nation of owners. We didn't tax people to rent; we gave people a deduction to buy.

STEPHANIE SY: That's also easier to sell.

STEVEN COHEN: It's much easier. It's politically much more popular. Environmental politics is what we have to pay attention to. We want to make this popular.

Everybody uses energy. So here's the argument—this is why energy efficiency, by the way, is so politically popular—what's the argument against it? "Spend more money? Waste energy?" What's the argument against cheaper, more reliable, renewable energy?

STEPHANIE SY: The government is a huge procurer in all sectors—whether it's the Defense Department using transportation—are they getting that? Are they moving in the same direction as some of the companies you were talking about toward green, sustainable energy use?

STEVEN COHEN: They were in the previous administration, particularly the military. The military was moving toward solar in many respects because you can't blow up a solar cell the way you can blow up a tanker, so it was considered a safer technology to bring and deploy, particularly in the Middle East. The military was also paying a lot of attention to base vulnerability because of sea level rise.

The issue now is whether under this administration, which is guided by ideology and fantasy, whether the facts of climate change are going to still be part of the management of the federal government.

STEPHANIE SY: The reason I asked that is I want to delve deeper into the companies, and I know a number—I think about 50 percent—of Fortune 100 companies, as well as many Fortune 500 companies, have set these science-based sustainability targets. Are they enough to really make a dent? And this includes big companies like Walmart and Microsoft.

STEVEN COHEN: Walmart is a leader because not only did they do it for themselves, but they required their suppliers to demonstrate the sustainability of their supply chain. What's interesting about that is that they're doing it because it makes for less expensive things to sell in Walmart. In other words, sustainability also means, "I'm paying attention to my use of order, my use of materials, my use of energy, and the environmental impact of what I'm doing."

One of the reasons why you want to pay attention to the environmental impact is that if you do something wrong—think of companies like Volkswagen or British Petroleum (BP)—the bill can be billions and billions of dollars. It's just good management to pay attention to that.

STEPHANIE SY: That also gets to cultural change. I understand part of your optimism is a belief that there is—I don't know if that's how you would describe it, but that was my interpretation of things you had written—that you sense there is a real cultural change that these companies are addressing; that younger generations, who polls show do care more about climate change, want to buy products that they believe were sustainably manufactured.

STEVEN COHEN: All the polling about Millennials says that this is important to them, and this is going to be the dominant force in the marketplace. It's already starting, and it is just going to get larger. That's one piece of it.

I think the younger generation has grown up understanding that we're in a more crowded world. When I grew up, there were 3 billion people on the planet; today there are 7.5 billion people. People know. Young people in particular get the idea. I read applications for my programs from students in China, and they're totally motivated by "the river used to be blue and now it's orange," and "the air used to be blue and now it's gray." People understand that.

I think because of the Internet, because of the web, because of smartphones, these images are shared globally and instantaneously, so everybody knows how bad the air is in Beijing. We had air that was just as bad in Pittsburgh, it was just as bad in L.A., but we didn't have the global media that we have today. So people kind of knew, but they didn't know the way you know about the air in Beijing.

STEPHANIE SY: That's a positive way to look at sort of the flattened earth via the Internet, but another way to look at that is that somebody from China sees everything that someone living in New York City has. They see that they

have a smartphone that they replace every four years when Apple comes out with a new version; they see that everyone has an air conditioner; they see that they're consuming at a rate and disposing of clothes, and they're living in a sort of disposable economy. What happens when everybody in India or China lives the way people in New York do?

STEVEN COHEN: Everybody sees these images. That's absolutely true. And it creates a political pressure for that kind of development that's irresistible.

But at the same time there's something else going on. I have a new book coming out next fall called The Sustainable City, and I have a chapter on sustainable lifestyles. So what are you seeing also? You're seeing the sharing economy. You're seeing lower levels of car ownership now in this part of the world. The culture is shifting to not accumulating stuff but experiencing and using stuff.

Because of the Internet, again, you can now use a car for two hours a day where 20 years ago that would have been impossible; the paperwork alone would have taken more time than it would have been worth. So we're starting to see the beginning of a sharing economy in many different aspects.

The nature of consumption is changing. One of the examples I often use is 20 years ago you could go to Blockbuster and rent a video. You'd bring it home, it would be a physical thing, it came in wrapping, and had to be shipped.

STEPHANIE SY: I remember Blockbuster.

STEVEN COHEN: Today you flip a switch, and streaming comes over. There's no material consumption at all; it's just energy. And if that energy was renewable, you are consuming, it's adding to the GDP just like Blockbuster did, but it's not using any physical good. So you're beginning to see an economy that is transitioning.

There are going to be a lot more people participating in that economy. China and India are the two places that have the most people in the world. Their consumption is going up. The question is: Can we develop this renewable resource-based economy in time to keep those billions of people from destroying the planet?

STEPHANIE SY: I want to talk about that notion of time, which you've mentioned a couple of times now, because among those that were at the 2015 United Nations Climate Change Conference (COP21) and among a lot of scientists who care about the environment and who study it, there seems to be a real sense of urgency that I'm not sensing from you, and yet you have said a couple of times that we don't really know whether we're going to be able to develop renewable energy technologies and batteries and carbon capture quickly enough. What assumptions are

you working on? You have access to some of the best scientists in the world on this stuff at the Earth Institute.

STEVEN COHEN: The technologies are uncertain, but I know people are working on—battery technology is a major emphasis in our engineering school. It's a major emphasis in all of the engineering schools that I know of, the top schools. Technion and Cornell are going to start a school up on Roosevelt Island here very soon in the East River, and that's going to be one of the things they're focusing on. I think you're going to start seeing those things come to market. So many of the things that transformed our lives have come out of our research laboratories.

STEPHANIE SY: And they've come quickly.

STEVEN COHEN: Yes. Think about global positioning systems (GPS). Again, what would life be without being able to look at your smartphone and figure out where you're going?

STEPHANIE SY: I don't even know how to read a map.

STEVEN COHEN: Right. This is referred to as the "diffusion of technology." Nobody really knows which technologies will come and be transformative and how fast they'll be used and what price they'll be sold at, but they're coming, and they have been coming. We see the trend lines already.

Imagine nanotechnology applied to batteries and solar cells. Instead of the solar array being $20,000 on your roof, it's $300 and it's on your window, and the battery, instead of it being the size of your wall, is the size of your laptop.

STEPHANIE SY: I can imagine that, just given how even in my lifetime I've seen so many advances. But are you confident that these technologies will be deployed quickly enough to avoid potentially catastrophic effects of climate change?

STEVEN COHEN: I believe they will be, largely because I think it's so important and so many people are working on it, and we've already seen the prices starting to come down. We're not at that tipping point; we're not at the point yet where people are saying, "I'm going to disconnect from the grid."

But I'll tell you, I used to ask my students all the time, "How many of you have landlines in your apartments or dorm rooms?" When I first started asking, half or two-thirds. I don't even ask the question anymore. A few years ago it went to zero. So they disconnected. Now the young people are disconnecting from cable television. They're getting TV through the wireless or through the Internet. Those technologies are being diffused very, very quickly; so quickly we don't even notice it while it's happening, except if you own a cable service, you know it's happening.

When that happens to electricity, imagine when electricity becomes so inexpensive. If your home renewable energy kit costs you $500, period, costs you $300, why connect to the grid, and especially if your battery is really reliable? Is that going to happen? Absolutely it's going to happen.

The reason we'll need the grid is big institutions and factories probably won't be able to generate the energy they need, but who knows what that will be like in 50 years? But I do think the technologies are coming. What I'm saying is I don't know what they're going to look like and how fast they're going to come, but I do see these as pretty much on the way.

STEPHANIE SY: Finally, I want to talk a little bit more about the Earth Institute and what sort of exciting—you've mentioned a lot of them here—things are coming up and what you're working on there.

STEVEN COHEN: The Earth Institute is a new kind of institution in academia. The way I sometimes talk about it is if you think about just the evolution of Columbia University: It starts as a little college, King's College before we had a country. People like Alexander Hamilton went there before there was a musical. Universities developed to meet the

social and economic needs of the day. So in the 19th century, you see the development of professional schools—medicine, law, journalism, and all that in the 20th century. The engineering school at Columbia, in many respects, was started as a school of mines to figure out "how do we dig into Manhattan bedrock to build the subway system?"

Go to 1996, and a group of people at Columbia formed something called the Global Systems Initiative to try to figure out "how do we deal with the problem of global sustainability?" We need environmental science, we need engineering, we need law, we need public policy, we need public health. We need all of these things together. But the university is set up by schools. So we set up a university-wide institute that reports directly to the provost where we bring together all of those places.

What we're able to do when we study an environmental issue like, say, arsenic in wells, the people who study it are environmental scientists from the Lamont-Doherty Earth Observatory and people from the Mailman School of Public Health working together. Then we might bring in somebody from the law school to talk about law aspects, or somebody like me from the School of International and Public Affairs (SIPA) to talk about public policy. So we bring it all together.

So, yes, the biggest issue that we're studying now is climate change. In fact, a major priority at Columbia University is what's called "climate response." The president of the university has made it a priority of the university to focus the whole university's attention—and our whole community's attention—on addressing climate change.

Columbia has more climate scientists than any institution in the world, and we are working hard at first understanding what's happening in the Arctic, what's happening with sea level rise, how do we adapt to climate change. We have a lot of people working in New York City—New York City has almost 600 miles of coastline—on how do we shore up the city so that the next Hurricane Sandy doesn't knock us out of commission.

We have people working on adaptation, but also on understanding the fundamental causes so we can figure out the pace—how fast is this happening? What is the threshold? When are we in deep trouble? We know it's happening; we know that we have to respond to it. The more we understand a problem, the better able we are to build our response to it.

I believe that human beings are ingenious and that we're not suicidal. We are going to figure out a way to solve this problem. But I think it's never easy. The most difficult problems are the hardest to solve and take the most effort.

STEPHANIE SY: I've heard you say that phrase, and I thought about it more. I think, again, it speaks to your optimism. Perhaps in my cynicism I thought of, Yes, I'd like to believe that's generally true, and yet human beings, despite all the warnings, still smoke.

STEVEN COHEN: Right. There's a good analogy between the fossil fuel companies and tobacco companies. But who would have thought that restaurants and bars in New York City would ban smoking? And yet it happened. People smoke; people do a lot of things that they shouldn't do.

Also, the EPA was started in 1970. By 1980, most of our regulatory structure was in place. Our GDP has grown tremendously since 1980, and the absolute level of air, water, and toxic pollution in this country has gone down. And it's not because we exported it to other countries; most of the air pollution in the country comes from cars and power plants. So we applied technology to those problems, and we have made them less bad.

I've seen that progress in my life. Go to Pittsburgh. The president said he wants to be the president of Pittsburgh and not Paris. I don't know why you can't be president of both.

STEPHANIE SY: A lot of innovation coming out of Pittsburgh, actually.

STEVEN COHEN: Pittsburgh is a much cleaner-air city than it was when they made a lot of steel there. Los Angeles, the air there is much cleaner than it was during the 1960s. So I'm optimistic because I've seen the positive change.

Income distribution is a big problem in this country, and I've seen that slip away, but the poverty rate overall in the 20th and 21st centuries has gone down from the beginning of the 20th century. We need to keep working at these problems, but I think when human beings pay attention to something they tend to solve it.

Two other things make me optimistic: One is that we haven't used a nuclear weapon since World War II, and there are a lot of them out there.

The second—my students did a paper on this after 9/11—9/11 was a great tragedy. Three thousand people died; 15,000 people got out of the two towers because they helped each other. That's not the story that anybody wants to tell. Surrounding the Trade Center, there were a bunch of schools. Not a single schoolchild was harmed, and everybody got out who wasn't above the 80th floor in those buildings. Really bad things happen, and people respond.

I also think that a lot of my colleagues are frustrated because they see this problem and really understand what's going on, and don't understand why it's not solved instantly. What I often say about policy is that "policy doesn't actually solve problems; it makes them less bad." But scientists solve problems.

In New York City we had like 280 homicides last year. In 1992 it was 2,200. That's a less-bad problem. But if you're one of the 280 dead people or their families, the problem is—

STEPHANIE SY: You still see it only one way.

STEVEN COHEN: The disciplines train you in different ways. So economists are more like climate scientists. Political scientists see all the noise. That's the other piece.

STEPHANIE SY: Steven Cohen, I really appreciate your perspective. Thank you.

STEVEN COHEN: Thank you.
